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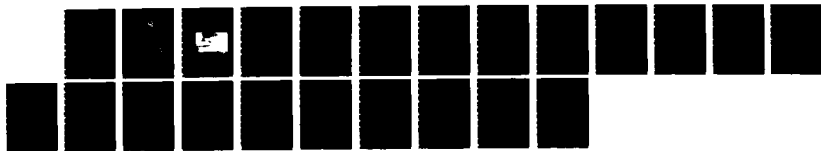
INFORMATION BROCHURE(U) ARMED FORCES FOOD SCIENCE
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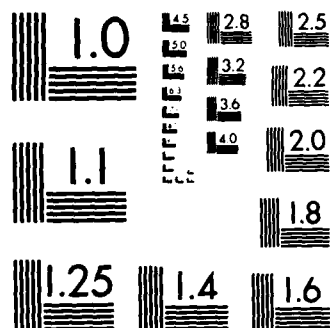
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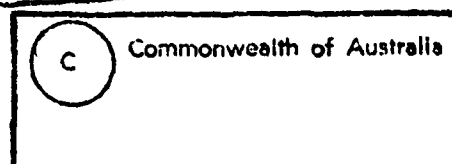
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ARMED FORCES FOOD SCIENCE ESTABLISHMENT



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Scottsdale, Tasmania.

August, 1985.



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INTRODUCTION

Welcome to the Armed Forces Food Science Establishment. It is hoped your visit will be enjoyable and informative.

In this brochure you will find background information concerning the purpose for which the Establishment was created, its administrative organization, present activities and potential. The scientific staff are available for discussion on all aspects of the Establishment's work.

During the period you remain with us you will have an opportunity to obtain detailed information on any aspect of our research and development in which you have a particular interest.

You are cordially invited to make the most of this opportunity.

A handwritten signature in cursive script, reading "Ross J. Richards". The signature is written in dark ink and is positioned above a horizontal line.

(Ross J. Richards, B.Sc., Agr. [Hons.] Ph.D.)
Defence Food Science Adviser.

BRIEF HISTORY

In 1954, development of three combat ration packs, for use by Australian Servicemen, was commenced. It commenced in Melbourne without the use of readily available laboratory facilities for the analyses of commercially processed foods, and without the use of equipment for the production and testing of "mock-up" containers, either tinplate or fibreboard.

Private industry was generally reluctant to spend time and money on the development of new products for which there might be only a limited Defence demand. There were few food processors who were able to provide detailed analyses of their product. This made it difficult to obtain quantities of some processed foods, having specified properties, that could be incorporated in complete ration packs for test purposes.

Nevertheless, during the ensuing four years, the following ration packs were developed and accepted into the Army supply system:

- a. Emergency Ration.
- b. 24-hour (one man) Ration (now Combat Ration [One Man]).
- c. 10-man Composite Ration (now Combat Ration [10 Man]).

Concurrent with this program of work on rations, there were four other defence food science projects being conducted in Australia. They related to meat dehydration, glucose-free egg powder, fat anti-oxidants and the compression of dehydrated vegetables. The work on compression was undertaken in a small research station located at Scottsdale, Tasmania, adjoining the only large dehydration factory in Australia. The limited facilities at this station were also used, to a minor degree, during the development of ration packs.

In 1958, it was decided to progressively terminate all defence food research in Australia except that connected with the development of rations for the Armed Forces. By then the Australian Armed Forces had ration packs of their own and the many advantages in replacing "canned equivalent" rations with ration packs especially designed for Australian Servicemen were fully appreciated.

Also, at this time, special consideration was being given to the development of lightweight patrol rations which included compressed blocks of dehydrated meat and vegetables. For this work, laboratory facilities, and various items of equipment for compression, were needed. These were available at Scottsdale where research had practically ceased. Hence, it was convenient and logical for work on the development of ration packs and ration scales to be moved to this readily available research station and the transfer, rather automatically, took place.

As the Australian Army had the greatest interest in the development of ration packs and ration scales, the activities of the research station were placed under the control of Army, although they also included research and development for the Royal Australian Navy and Royal Australian Air Force. For the operation of the research station, the Army raised an appropriate establishment comprising civilians and servicemen. During the ensuing years various changes to this Establishment were made in the light of demonstrated needs for specialist personnel. The present organization is shown in Appendix B.

The original research station, in which work on compression had been conducted, was a World War Two building which had been moved to the site and appropriately modified. In 1965 Army added an administrative block comprising library, conference room, offices, tea room and toilet facilities. In 1970 a large experimental processing wing, new boiler house, laundry and Q-store complex were added and land acquired for a car park.

By 1971 the range of activities of the Establishment had expanded to cover work for all three Services, and this was reflected in a change of name to the Armed Forces Food Science Establishment. In 1977 a large, new, prefabricated store was added, and in 1980 new laboratories were completed for nutrition, chemistry and microbiology. A new library, engineering workshop and food museum were added also.

Several reorganizations of the Department of Defence have occurred since 1975. Currently the research and development laboratories of the Defence Science and Technology Organization are located in the Department of Defence. The AFFSE has administrative links with the Materials Research Laboratory.

FUNCTION AND ROLES

FUNCTIONS

The Armed Forces Food Science Establishment is an element of the Defence Science and Technology Organization which has the following functions:

- a. Provide scientific and technical advice on defence policy matters;
- b. Provide scientific and technical support:
 - (i) To the Australian Defence Force in its task of maintaining effective forces in being and for the development of those forces;
 - (ii) For the acquisition of defence materiel;
and
 - (iii) For such other matters as specified by the Minister for Defence;
- c. Maintain a technology base to support the Australian Defence Force, the Department of Defence and defence industry; and
- d. Carry out the initial development of selected prototype equipment, to meet approved Defence requirements.

ROLES

To discharge its functions, the Armed Forces Food Science Establishment (AFFSE) is to:

- a. Determine the energy and nutrient requirements of Servicemen under the various conditions in which they may be required to operate, and translate these requirements into practical ration scales and ration packs suitable for use under Service conditions;
- b. Establish and maintain scientific and technical skills and facilities necessary to:
 - (i) Monitor and evaluate new developments in food manufacture that may have application to the Australian Defence Force, for development of special ration components, and the development of new rations;
 - (ii) Conduct troop feeding trials under combat conditions to provide direct user response on the acceptability, adequacy and Service suitability of the rations;

- (iii) Perform chemical, microbiological and organoleptic analysis of foods and research into appropriate methodology;
 - (iv) Investigate physiological requirements of Service personnel in relation to food and water needs in the military environment and to advise on and design survival packs;
 - (v) Produce sufficient quantities of new products for field trials to gauge service suitability;
 - (vi) Produce Service food components for which the peace time demand is insufficient to attract commercial manufacture; and
 - (vii) Liaise with industry on the development and promotion of foods, processes and equipment of interest to the AFFSE.
- c. Initiate and support research and development programs in food science and technology having defence potential in non-defence institutions in Australia.

GENERAL CHARTER

The charter would be relatively simple to fulfil if all Servicemen were engaged in normal civilian occupations and located in permanent barracks with regular supplies of fresh food, an ample supply of fresh water and adequate refrigeration and food preparation facilities. But they are not. The majority, especially in time of war, are housed in tents and constantly on the move; many are engaged on long range patrols over rugged terrain, others fly at high altitudes under confined conditions and some are in small ships subject to the incessant movement of the sea. Fresh foods may not be available and, in any case, are of little use when foods have to be transported long distances without refrigeration and then held for periods far in excess of their life as a fresh commodity.

Hence ration scales based on the utilization of non-perishable foods have to be developed. Non-perishable foods are those that have a satisfactory storage life when stored for considerable periods under tropical conditions. For test purposes, they must have a reasonable level of consumer acceptance after being stored for two years at 30°C. Most commercially processed foods will not meet this test and, hence, special food specifications are necessary to meet the requirements of the Armed Forces. This preparation of such specifications is a continuing and major responsibility of the Establishment.

In translating energy and nutrient requirements into ration packs, great care is taken to ascertain, by means of large scale troop feeding trials, the troop acceptability of each component in a ration pack. This normally requires several troop feeding trials to ensure that only components with high degrees of acceptability are included in the final design. It also ensures that the ration packs have the smallest possible weight and volume. It keeps wastage to a minimum and, as a result, keeps the cost of feeding to a minimum.

For a soldier on patrol the length of the patrol is normally determined by the amount of food he can carry. Hence patrol rations must be as small in volume and light in weight as possible. When all technological means of reducing volume and weight have been exhausted: trimming of bones and other inedible material, removal of as much water as possible, increasing energy value by the addition of fat and use of pouches instead of cans; the only avenue left is to determine to what extent food consumption can be reduced without impairing combat effectiveness. This, and its many related problems, is a major activity of the Establishment.

Ration packs for survival purposes require special consideration. The Services mainly concerned are the Royal Australian Navy and Royal Australian Air Force. Survival packs for both these Forces have been developed and are constantly under review. Nevertheless, it is fully realised that, under survival conditions, water is far more important than solid food. Therefore, the Establishment also investigates the means of providing safe water in survival conditions.

Other major activities, complementary to the foregoing, that lie within the charter of the Establishment are hot-air drying, freeze drying, explosive puffing and compression of various foodstuffs. The Establishment conducts research into various aspects of each process and is well equipped with pilot plant for small scale production. It only engages in production on a larger scale when private industry is unable to meet the requirement for a product that has been developed and is required by the Defence Forces.

RESEARCH AND DEVELOPMENT PROGRAM

Towards the end of each calendar year, the three Services are invited to submit for consideration problems that might be investigated by the Establishment. Each submission is carefully investigated, firstly to decide if a problem really exists and then, whether the Establishment is the best place in which to have it investigated. Some problems might best be investigated by the Commonwealth Scientific and Industrial Research Organization, other Government departments or private industry.

If it is agreed that a scientific or technical problem exists, and that it can best be investigated by the Establishment, it is developed formally into a task and submitted for inclusion in the DSTO Planning Base. All tasks are reviewed annually for financial support and six monthly for scientific progress. Annual reports are made for sponsor information and continued support. Urgent tasks can be implemented if required, and these do not have to wait for the annual processes.

Consultation with other authorities such as CSIRO, Commonwealth and State Departments and the commercial food industry is undertaken before any new research programs are begun. The AFFSE endeavours to foster co-operation at all levels with others in the food industry to achieve maximum use of resources and prevent any duplication of effort. Co-operative projects are entered into with other groups where equipment or expertise can be shared for mutual benefit.

ORGANIZATION

The Establishment is organized into the following sections, Food Science, Food Technology, Experimental Processing, Nutrition and Physiology, Engineering Design and Maintenance and Administration. However, the Establishment operates on an integrated basis as many tasks involve more than one section.

FOOD SCIENCE

The section has responsibility for chemical and microbiological analysis of foods and research into the appropriate methodology.

Chemical analyses are conducted for protein, fat, carbohydrates, water, ash, metals, vitamins, preservatives and pesticides. A wide selection of modern instruments is available to undertake the above analyses. It includes gas and liquid chromatographs, spectrophotometers and a protein analyser. Many of these instruments are being automated.

The principal products examined are complete ration packs used by the Defence Forces, including Combat Ration (One Man) - CR1M, Combat Ration (Ten Men) - CR10M, Patrol Ration (One Man) - PR1M, and the Emergency Flying Ration - EFR. If required by the Establishment's research program, new commercial products, experimental products and indigenous foods (bush foods) are also examined.

Microbiological examinations are conducted on locally produced and other food samples for quality control purposes, and investigations are conducted to determine standards which ought to be expected in commercial production. Facilities available are adequate for the determination of total viable plate counts, detection of yeasts and moulds and the culture and identification of possible food contaminants such as enterobacteriaceae, shigellae, staphylococci, salmonellae and coliforms.

Methods used conform to the Australian Defence Force Food Specifications and the Standards Association of Australia. The laboratories are registered with the National Association of Testing Authorities (NATA) and participate in Australia-wide testing programs to validate methods.

FOOD TECHNOLOGY

The section has responsibility for monitoring new developments in food manufacture that may have application to the Defence Forces, for development of special ration components, and in conjunction with the Nutrition section, development of new rations. All ration components are organoleptically tested both before and after storage at elevated temperatures, and for this, controlled temperature and humidity rooms and a taste testing kitchen and booths are available.

As most foods contain 60 to 90 per cent water there is considerable emphasis in the section on methods of food dehydration as well as compression. Equipment includes roller, tray, belt trough, bin and freeze-drying pilot scale dehydrators. Textural changes in meat following drying are very important in relation to consumer acceptability. The section uses a texturometer and texture tester for such studies.

Packaging is an integral part of food processing technology of special significance to Defence Food Science. The evaluation of flexible packaging systems to minimise mass and reduce wastage disposal problems is a further activity of the section.

EXPERIMENTAL PROCESSING

The section is under the control of the Food Technology section and works closely with the Engineering Design and Maintenance section.

It has two functions. One is to produce sufficient quantities of new products for field trials on a large enough scale to gauge service suitability, while at the same time determining any changes that are necessary in scaling up manufacture to a commercial level. The second function of the section is to produce Service food components for which the peace-time demand is insufficient to attract commercial manufacturers. A major activity in recent years has been a detailed study of processing parameters in freeze-drying of composite meals. This research and development program has achieved international acclaim and has led to the development of a new combat ration feeding system for the Defence Force.

Other work carried out by the section includes packaging on a small scale of speciality items which include the Australian Army Emergency Ration, the Emergency Flying Ration, Emergency Water and an Emergency Ration for use by RAAF pilots.

NUTRITION/PHYSIOLOGY

The role of the Nutrition/Physiology section is synonymous with the charter of the Armed Forces Food Science Establishment — that is the assessment of the nutritional requirements of Servicemen under the various conditions in which they may be required to operate and the translation of these requirements into practical ration scales and ration packs suitable for use under Service conditions.

This role is achieved by adopting a multidisciplinary approach and considerable time and effort are directed at liaising with the Services, industry and other sections of the AFFSE to ensure that the Service consumer is provided with nutritious, wholesome and acceptable foods in line with his or her activities.

The military characteristics of a ration may relate to the bulk and weight, the number and type of meals to be provided by the ration, the maximum number of components, the minimum preparation time allowed, the maximum storage life, and the distribution and handling characteristics of the ration. When designing a new ration, the section is required to satisfy these characteristics. These requirements may be met by the use of existing commercial food components or by limited in-house production. After successful organoleptic, chemical and microbiological evaluation, the section has the responsibility to design and conduct field user trials of the ration.

Extensive troop feeding trials under combat conditions constitute an extremely important activity for the section, as they provide direct user feed-back on the acceptability, adequacy and Service suitability of the rations. The data from the trials enable necessary modifications to be made to the rations to achieve consumer acceptability. Combat efficiency, food cost and wastage are accorded high priority in such work.

The range of rations for which the section has responsibility includes ration packs designed for emergency and survival purposes, rations for extended patrolling and assault purposes, situations where there is little guarantee of daily provisioning and rations which are not packaged but provided according to a scale.

A further major activity of the Nutrition/Physiology section is a regular review of the Australian Defence Force Ration Scales to ensure that the issue is based on sound nutritional practices while providing maximum flexibility in the choice of food items. Food usage and wastage surveys in static messes are conducted as part of this activity. Physiological studies under survival conditions are performed to assess food and water requirements.

ENGINEERING DESIGN AND MAINTENANCE

The size, location and type of research and developmental programs undertaken by the AFFSE require an Engineering section that is versatile to cover the breadth of activities involved in the provision of engineering services.

These services include the design, installation, fabrication, testing, modification, commissioning, development, maintenance and operation of plant and equipment. The section is responsible also for the provision of technical specifications, recommendations, and procurement requests for new items of equipment, the provision of cost estimates and operating and maintenance instructions for plant and equipment. The preparation and processing of technical requirements for all facility aspects of the Establishment, including major new building requirements and repairs and maintenance of buildings, is an additional function.

The section also undertakes experimental food projects and tasks and provides assistance in project work to other sections of the AFFSE as required. The section liaises with industry on the development and promotion of processes and equipment of interest to the AFFSE and compiles relevant technical information.

ADMINISTRATION

This section includes the library and all management cells. The *Officer in Charge* is assisted by an Assistant OIC who is in charge of the Food Technology and Experimental Processing sections, an Administrative Officer (Army Captain), a Quartermaster Sergeant, clerical assistant and typist. A number of staff functions are supplied by the Defence Regional Office, Hobart. Army provides many services which facilitate the administration of the Establishment.

CO-OPERATIVE AND CONTRACT RESEARCH

In addition to the defence food research and development undertaken at the Armed Forces Food Science Establishment, a small amount of defence food research has been undertaken in several Australian universities on a contract basis.

This research is confined to basic work requiring the use of highly sophisticated equipment for which the Armed Forces Food Science Establishment would have no general use, or requiring academic training and skills normally found only in universities and similar institutions.

These are subject to annual review and each may be continued for a period of about three years. New projects are considered from time to time and, as one reaches completion, another may be commenced.

The Defence Food Science Adviser is responsible for arranging the funding of these projects and for recommendations for their continuance or termination. Contracts have been entered into with the Universities of Melbourne and Adelaide.

Co-operative programs with appropriate institutions are undertaken as required. Other Government departments and the CSIRO are involved while the commercial food industry has a close association with the AFFSE in developmental work. A number of companies are participating usually at the one time. The results of the AFFSE programs are made available to industry freely by direct contact and consultation in addition to published reports.

PUBLICATIONS AND REPORTS

The AFFSE reports on projects in a number of ways largely determined by the nature of the task and the sponsoring agency.

As the Establishment is a member of the Defence Science and Technology Organization, the majority of reports are directed at the Defence and allied communities in Australia and overseas. There is a well defined format for DSTO publications and this is followed for most reports. Publications are largely unclassified and are distributed widely to appropriate institutions as well as to Defence Commands according to a distribution list.

As a result of a decision by the Commonwealth Defence Science Organization, member countries produce an Activities Report at intervals. These reports represent a summary of achievements in defence food science and provide overseas countries with a concise statement of current work. A list of reports is attached as Appendix C. Copies of most of them are available on request.

OVERSEAS CONTACTS

The AFFSE maintains close contact with a number of countries through the Food Study Group of the Commonwealth Defence Science Organization. The FS' meets approximately every three years where reports and scientific papers are presented. Membership of the group is thirteen countries with the USA having observer status. Bi- and multi-lateral exchanges occur through the FSG on many areas of defence food science. Co-operation with France has been developed and closer ties established with New Zealand, the United Kingdom and the United States of America. Technical reports are exchanged on a regular basis and there is much officer to officer contact.

MAJOR EQUIPMENT

In the laboratories there is the usual equipment for analytical, bacteriological and physiological research, including the following items:

- Balances electronic
- Bomb Calorimeter, Gallenkamp
- Calculators programmable
- Can Vacuum Tester
- Centrifuges
- Computer Controlled Block Digester
- Constant Temperature Rooms
- Controlled Humidity Room
- Cycle Ergometer, Monark (two)
- Data Station, Perkin Elmer
- Data Station, Labtam
- Data Station, Sharp PC1500
- Perkin Elmer 240C
- Elemental Analyzer
- Fluorimeter, Jasco
- Gas Chromatograph, Varian
- High Pressure Liquid Chromatograph LDC
- Inductively Coupled Plasma Emission Spectrophotometer, Labtam
- Infra-red Spectrophotometer, Perkin Elmer
- Laminar Flow Cabinets (two)
- Liquid Dispensing Units
- Manometer, Camden
- Maturometer
- Metabolic Gas/Volume Analysis Equipment
- Omni Mixer, Sorvall
- Polarimeter
- Refractometers
- Sample Freeze Drier
- Socially Acceptable Monitoring Instrument (two)
- Stomacher, Colworth
- Texture Tester, Instron
- Texturometer, Zenken
- Titrator, Radiometer
- Treadmill
- Ultra-sonic Tank
- Ultra-Violet Spectrophotometer, Shimadzu 240
- Viscometer Brookfield (two)

Pilot plant includes the items listed hereunder:

Atmospheric Steamers (two)

Automatic Weight/Volume Powder Filler

Belt Trough Drier

Bin Drier

Blending Machine, Double Cone

Cold Rooms operating at temperatures which are varied to meet requirements (six)

Compression Line comprising scales, conditioning unit, two pairs of hydraulic presses, restraining unit, gas packing unit for cans and gas/vacuum packing unit for pouches

Deep Fryers

Explosive Puffing Gun

Form Fill Seal Packer

Freeze Drying Line comprising freezing chamber, Budge freeze drier capable of continuous and cyclic drying and a controlled humidity packaging room

Freeze Drier, 1.1 sq. m. shelf area

Freezers, Cryogenic

Hammer Mills

Hot-air Drying Line comprising preparation tables, blanching and sulphiting equipment and hot-air drier with trays for through or cross-draught drying

Hot-air Drier

Mincer/Slicer/Comminutors

Mobile Freezer

Pouch Sealing Machines

Printing Press

Roller Drier

Semi-automatic Food Press, Pilot

Slicers, Dicers, Comminutors

Spray Dier, Niro

Steam Bells

Stoves

together with boilers, steam superheaters, compressors, cooling towers, settling tanks, pumps and all the other ancillary equipment necessary for the operation of the above pilot plant.

SCOTTSDALE

Scottsdale is a thriving rural town. There are a number of modern shops and buildings, a modern 33-bed medical, minor surgical and midwifery hospital with a 16-bed geriatric wing, a weekly newspaper, a broadcasting station, an hotel, a modern hotel-motel, and a modern Services Club. The recreation area comprises two ovals, show ground and nine hole golf course, covering some 10 ha. There are facilities for football, hockey, cricket, softball, tennis, squash, badminton and a heated swimming pool. There are also tracks for trotting, athletics and cycling.

64 km from Launceston via the Sidling (see Appendix A), Scottsdale may also be reached via Lilydale on the East Tamar, and by three alternative routes, all picturesque, via Karoola, Piper's River and Bridport. A new highway connecting Bell Bay on the Tamar with the North-East provides an outlet for its produce as well as an attractive route for visitors.

There is a regular coach service between Launceston and Scottsdale, Red Line Coaches leave the coach depot at 112 George Street, Launceston, on week days at 8.45 a.m. and 4.00 p.m., and leave Scottsdale at 9.30 a.m. and 3.30 p.m. There is a train service but it only handles freight. Most people travel from Launceston to Scottsdale by car - private or hire. Travelling time is about one hour.

Near Bridport, 20 km north of Scottsdale, there is a small airfield. This may be used by light aircraft and is a good alternative to road travel in the right conditions.

Scottsdale is well geared to make the visitor comfortable and keep him interested. Accommodation is provided by an hotel and hotel-motel, with golf, swimming, tennis, bowls, beautiful drives, magnificent scenery, and the wonderful display of flowers for which the district is justly famous.

Booking for accommodation should be made well in advance, especially in the tourist season. If there is no accommodation in Scottsdale, it may be available at the hotel in Bridport.

FREIGHT AND COMMUNICATIONS

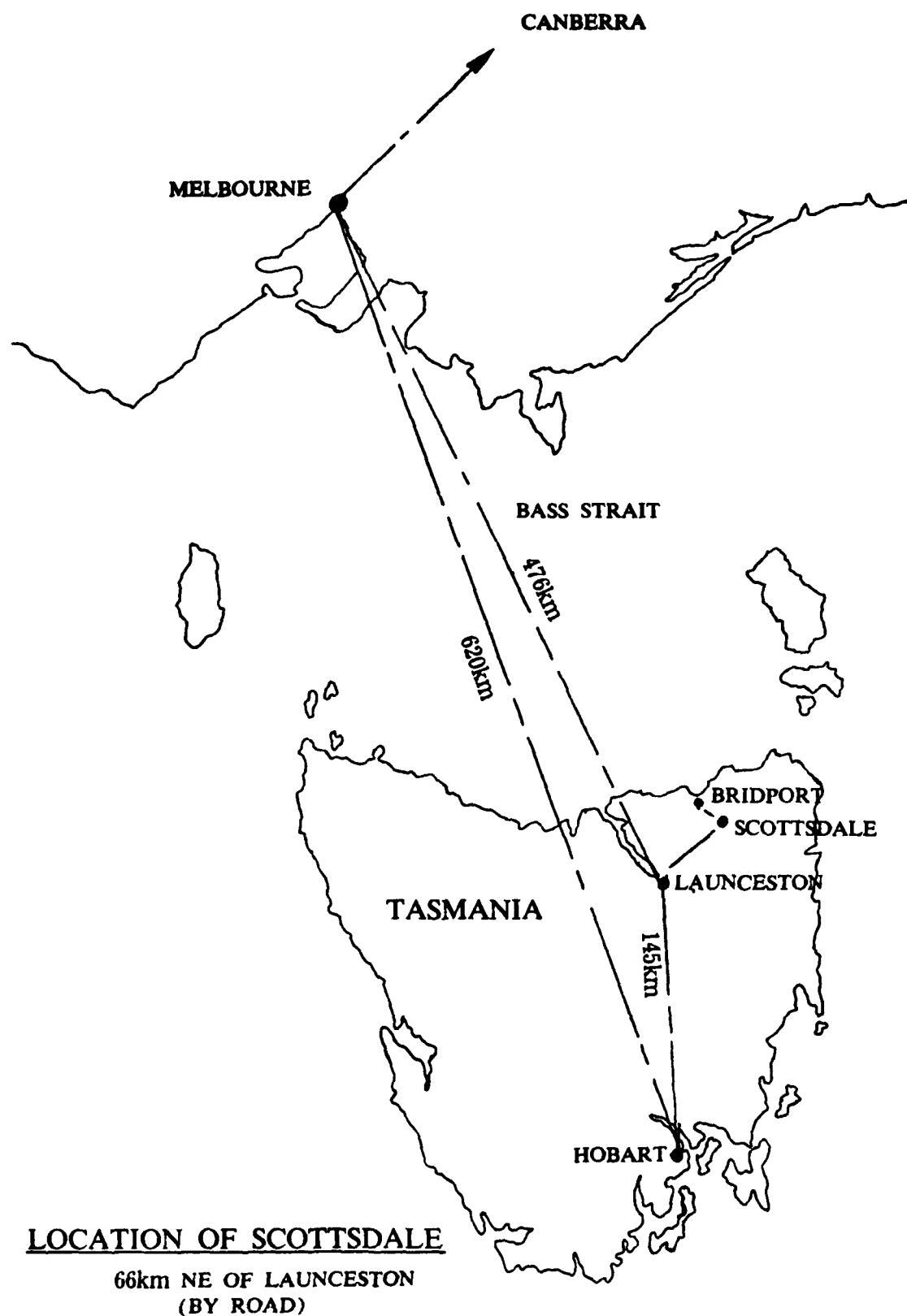
Small parcels, including food samples, should be sent by air freight, through TAA or Ansett, preferably for collection at Launceston Airport. The Establishment should be notified of this as early as possible.

Letters to the Establishment should be addressed as follows:

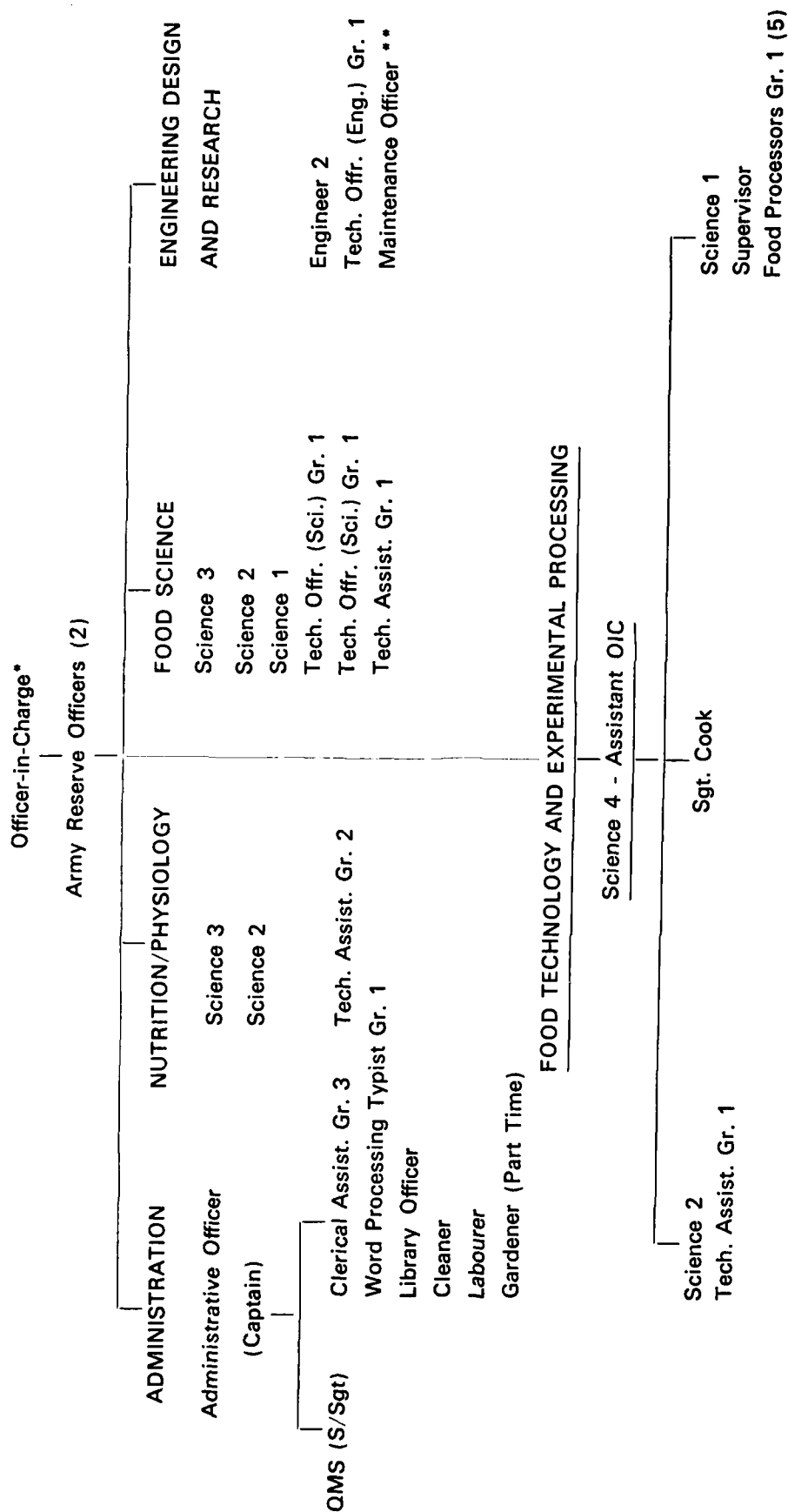
Armed Forces Food Science Establishment,
P.O. Box 147,
SCOTTSDALE, Tas., 7254.

The telephone number is (003) 52 2033.

The Establishment also has telex facilities. Telex No. AA58796.



Armed Forces Food Science Establishment



* Defence Food Science Adviser

** Department of Construction

TOTAL STAFF - 33

REPORTS

DG/1	Dehydrated Vegetable Investigations.	
DG/2	Standard Procedures for the Large Scale Preparation and Cooking of Dehydrated Vegetables.	
DG/3	Tasting Tests and Troop Feeding Trials on Dehydrated Vegetables.	
HQ/1	Fibreboard Cartons for Military Use.	
HQ/2	Report on Dehydrated Egg Investigations.	
HQ/3	Field Trials on Ration/Emergency Chocolate.	
HQ/4	Patrol Ration for the Pacific Islands Regiment.	
HQ/5	Field Trials of Prototype Combat Ration, Lightweight.	
HQ/6	Storage and Evaluation Trials on Ration/Emergency Chocolate.	
HQ/7	Storage Trials of Compressed Carrot.	
HQ/8	Field Trials of Second Prototype Lightweight (One Man) Ration.	
HQ/9	Storage Trials on Nitrogen Packed, Glucose-free Egg Powder.	
IR/1	Instructions for Caterers and Cooks on the Reconstitution and Cooking of Dehydrated and Compressed Dehydrated Vegetables and Meats.	
IR/2	Interim Report on the Dehydration of Green Stringless Beans.	Capt. J. G. Fairbrother.
IR/3	Second Interim Report on the Dehydration of Green Stringless Beans.	
IR/4	Preliminary Report on Development of an Improved Service Biscuit.	Maj. W. M. Aird.
IR/5	Preliminary Report on Nutritive Value of Bully Beef and Biscuits.	R. C. Hutchinson.
IR/6	Second Report on Nutritive Value of Bully Beef and Biscuits.	S. W. C. Smith.
IR/7	Interim Report on Pre-mix Bread.	Maj. W. M. Aird.
IR/8	Further Report on Pre-mix Bread.	R. C. Hutchinson.
IR/9	Interim Report on Storage Trials of Instant Potato Flakes.	J. G. Fairbrother.
IR/10	Final Report on Storage of Instant Potato Flakes.	J. G. Fairbrother.
IR/11	A Brief History of Freeze-Drying.	
IR/12	Pilot Plant for Accelerated Freeze Drying.	J. G. Fairbrother.
IR/13	Development Trial on a Special Purpose Ration Pack.	C. F. A. Younger.
IR/14	Training Ration Pack (Two Man). Report on Consumer Acceptance Questionnaires.	S. W. C. Smith.
IR/15	The Acceptability of Pre-cooked Freeze-Dried Meat.	C. F. A. Younger.
IR/16	Combat Ration (One Man) User Acceptability Trial.	S. W. C. Smith and C. F. A. Younger.
IR/17	Combat Ration (Ten Man) User Acceptability Trial.	S. W. C. Smith and C. F. A. Younger.
IR/18	A Preliminary Report of the Effect of Pre-Cooking on Freeze-Dried Lamb with Special Reference to Histological Changes.	C. F. A. Younger and B. H. Baigent.
IR/19	The De- and Rehydration of Vegetables with Special Reference to Carrots.	B. H. Baigent.
MR/18	Accelerated Freeze-Drying.	J. G. Fairbrother.
MR/19	Report on Sample of British 24-hour Ration Pack.	C. F. A. Younger.
MR/20	Combat Ration (One Man) Experimental User Acceptability Trial.	Dr. Rainer.
MR/21	Analysis of Rations Taken by Australian Soldiers on Patrol in Borneo.	C. F. A. Younger.
MR/22	The Estimation of Thiamine in Foods - a Critical Review of Methods.	W. E. Badcock.
MR/23	Field Trials of Modified Patrol Ration for the Pacific Islands Regiment.	C. F. A. Younger.
MR/24	Acceptability of Curried Beef and Green Bean Blocks.	C. F. A. Younger and W. E. Badcock.
MR/25	Microbiological Studies of Dehydrated Carrot during storage.	S. W. C. Smith.
MR/26	The use of Butter Powder in the Compression of Instant Dehydrated Potato.	C. F. A. Younger and J. G. Fairbrother.
MR/27	Organoleptic Evaluation of Foodstuffs for Service Use.	J. G. Fairbrother.
MR/28	Assessment of Physical Efficiency of 200 Personnel at the Infantry Centre, Ingleburn.	C. F. A. Younger and W. E. Badcock.
MR/29	The Compression of Instant Bread-mix.	J. G. Fairbrother and C. F. A. Younger.
MR/30	Possible High Energy Synthetic Foods.	B. H. Baigent.
MR/31	The Canning of Drinking Water.	J. G. Fairbrother.
MR/32	The Compression of Formulated Dessert-Type Dried Foods.	J. G. Fairbrother.
MR/33	Carrot Variety Trial.	J. G. Fairbrother.
MR/34	Onion Variety Trial.	J. G. Fairbrother.
MR/35	Onion Varieties Suitable for Dehydration.	J. G. Fairbrother.
MR/36	Estimation of Pungency in Onions.	W. E. Badcock.
MR/37	The Effects of the Antioxidant Butylated Hydroxy Toluene on the Rat.	
MR/38	Effects of Temperature and Humidity on Physical Efficiency as measured by the Cycle Ergometer.	C. F. A. Younger.

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